

6

What happens when I use journals in a math class?

When we want to have students explain their thinking or how they solved a problem, we may ask students to write in a math journal. It is a major challenge, however, to get students to write about what they have done in a way that reveals their conceptual understanding of the concepts taught. Marlene's story is one of a grade four teacher's journey in using math journals as a tool to increase student learning and their ability to articulate it. The journey was bumpy, but her conclusion is that the information obtained made it very worthwhile.

Things to look for

- assessing conceptual understanding vs. procedural knowledge
- assessment *for* learning
- feedback

USING MATH JOURNALS & RUBRICS TO CHECK FOR UNDERSTANDING

The Story of Marlene

I have been teaching mathematics in a grade four classroom for four years now and feel fairly confident in my teaching abilities. I have attended numerous professional development opportunities about teaching elementary math, and I try to stay current with the research regarding math and learning. Our class regularly uses manipulatives, plays math games, sings math songs, incorporates technology, has problem solving contests, and listens to mathematical stories. For the most part, I would say the grade four students I have taught math to enjoyed the subject, or at the very least performed the activities without complaint. In regards to performance, I believe my class results these past four years have been average: a few high achievers, the majority of students who meet grade-level expectations, and a few who minimally or do not meet grade-level expectations.

Last year in math I added a new component to my program, the use of math journals. I used math journals as a pre- and post- assessment tool to complement the continual use of my regular assessment methods (which was usually pencil and paper tests). In the math journals I posed problems and questions, asking students to explain their answers and thinking (everything from “what is multiplication?” to “explain why the answer to this problem is wrong”). The use of math journals as an assessment tool in my classroom brought to my attention problems in my students’ learning that I was not previously aware of, despite my belief that I had been teaching math well.

As I began to read the students’ journals I quickly realized the students who I thought were fully meeting expectations in math (largely because they could do quick calculations accurately) were actually minimally meeting expectations and had poor conceptual understanding. I had students who would get 100% on a long division test but did not understand what dividing numbers actually meant.

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Realizing what an insightful tool math journals had the potential to be, I designed a rubric to accompany the journals based on the BC Performance Standards for Numeracy. The rubric assesses understanding of both calculations and concepts, looking at four key areas: strategies used, clarity, accuracy & details. The rubric helped me better assess the math journals I was reading

This year I decided to take my math journals and the accompanying rubric up a notch in class. I wanted to use them more often in class as a formative assessment instead of the summative assessment I had previously used them as. My plan was to use the journals for each math topic that I taught, and to use them at least three times during the topic. By using the math journal throughout, it was my goal to see early on who showed a true understanding of the math concepts taught and who did not. Specifically I wanted to know when students were ready to move on to the next step, when they needed more practice, and which students needed more serious intervention. I saw math journals as a way to become more clear about my students' math abilities.

Overall I am quite happy with my math journal experiences. Working with and assessing the math journals has helped me determine where my students are at. I am able to confidently distinguish between those students who are fully meeting and those who are minimally meeting expectations. Using the journals as a formative assessment has improved my teaching practice, opening the door to more explicit small group instruction that I may not have done before. The students have also had success working with the journals and rubrics. Having an outlet other than regular practice questions let some students really shine at demonstrating the depth of their knowledge. Many students are becoming more comfortable explaining their thinking and use of mathematical strategies. Moreover, all students are now familiar with how the math rubric works and are able to self-assess fairly accurately.

The road with math journals has not been easy though. There have been several rocky bumps along the way. Math journals have proved to be rather challenging at times for a handful of students. For some, written output was an issue. These students struggled greatly with putting their

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thoughts into words, pictures, and examples. For those few students who really struggle, working on math journals was often a time when the student stared hopelessly at a blank paper for long periods of time before they were willing to risk a guess. I also made the rookie mistake of eagerly jumping into math journals at the beginning of the year without proper explicit instruction on the rubric and my expectations. I was initially discouraged by the quality of the journals until I realized I missed a vital step. Annoyed with myself, I went back and properly introduced the rubric to my students. Despite these challenges, I plan to continue my use of math journals as a formative assessment tool as the benefits outweigh the drawbacks.

Using math journals has given me a deeper insight to my students' thinking and learning. I now feel confident that I know where my students are at, and they know what is expected of them. My next step is to work on finding the best instructional strategies to increase students' conceptual understanding, so that more and more of my students will be able to go off to the next grade as mathematical thinkers.

Further Discussion

1. What was Marlene's purpose for having the students keep a math journal? What was she looking for when she assessed the students' journals?
2. What does Marlene hope to learn from having students keep a math journal?
3. How was the information gathered from the journaling used in ways other than what she had initially planned?
4. Is journaling a legitimate form of assessment? If so do you feel it is assessment *of*, *for*, or *as* learning?
5. How did Marlene use journaling to increase student confidence and ability?
6. Marlene says that struggling students "stared hopelessly at a blank paper." Do you think is this a struggle with mathematical understanding, or with writing? What does it say about the validity of journals as a tool for assessing mathematics?

